

Senior Thesis

**The Brachiopod Communities and Systematic Paleontology of  
Anticosti Island**

By

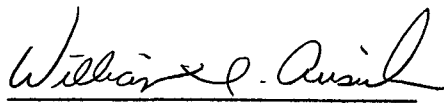
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Submitted as partial fulfillment of the requirements

For the degree of Bachelor of Science in Geological

Sciences at The Ohio State University Autumn 2003

Approved by:

A handwritten signature in black ink, reading "William I. Ausich", written over a horizontal line.

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## INTRODUCTION

### Location

Anticosti Island is located in the Gulf of St. Lawrence and on the eastern seaboard of Canada, about 75 km north of the Gaspé Peninsula and 175 km west-northwest of Newfoundland. It is about 222 X 56 km (132 X 35 miles) in area, and has a maximum elevation of 315 m (Lespérance, 1981) (See Figure 1). The Ordovician and Silurian rocks are exposed mainly by a series of coastal cliffs and bluffs. The inland area is densely forested, and only scattered outcrops occur in river valleys and roadcuts, which have become more common in the recent years (Jin, 1989).

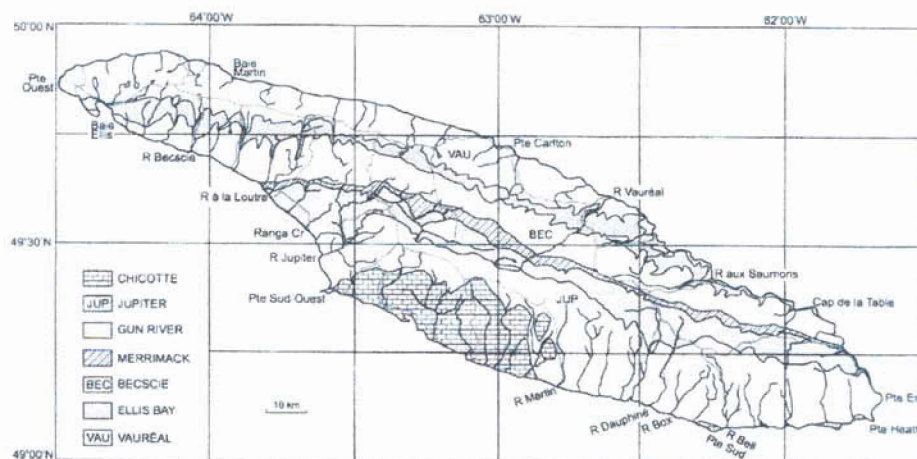


Figure 1. Geological map showing the Upper Ordovician Vauréal and Ellis Bay formations and the Lower Silurian Bescie, Merrimack, Gun River, Jupiter, and Chicotte formations of Anticosti Island, Gulf of St. Lawrence, Québec. Taken from Jin and Copper, 2000.

## History

The first recorded sighting of the island was in 1534 by Jaques Cartier. Legend has it that it was named after the Indian name, Naticousti, meaning “the hunting ground of the bear” as early as 1609, and changed into Anticosti. An alternative derivation could

also be “anti” and “costa”, meaning “before the coast” (Lespérance, 1981). The island was uninhabited until 1680, when Louis Jolliet was granted a fiefdom and seignior by King Louis XIV. In 1763 Anticosti Island became part of Newfoundland with the treaty of Paris. The island then became Québec territory in 1825. During the first half of the nineteenth century there were several attempts to colonize the island, until 1974 when Québec purchased it. The island is now a haven for sportsmen for fishing and hunting (Lespérance, 1981). The only permanent settlement left on Anticosti Island is Port Menier in Ellis Bay (Jin, 1989).

### *Geology*

The sediments on and surrounding Anticosti Island were formed in a basin from the latest Proterozoic to the latest Silurian, although only the Upper Ordovician and Lower Silurian are exposed on the island (Jin and Copper, 2000). The basin was asymmetrical with maximum subsidence on the eastern side. It was crescent shaped and approximately 50,000 km<sup>2</sup> in area, extending 700 km from the St. Lawrence River mouth to the western coast of Newfoundland, and approximately 250 km in maximal width (Jin and Copper, 2000). During the Late Ordovician and Early Silurian, the Anticosti Basin was the site of a relatively stable carbonate platform on the eastern margin of the North American craton. It was partly separated from the Iapetus Ocean by the Taconic Mountain belt to the southeast. To the northwest, the basin graded onto the Canadian Shield. The paleogeographical setting of the Anticosti basin was generally low energy, shallow-water (deeper than intertidal) environments (Jin and Copper, 2000), although the shallowest facies are reef horizons.

On the island itself, the Ordovician rocks are generally on the northern part of the island and the Silurian rocks are generally on the southern part of the island. According to Jin and Copper (2000), the surface exposures and subsurface boreholes reveal the presence of an Upper Ordovician (Caradoc) to Lower Silurian sedimentary sequence with a total thickness of approximately 2,500 m. But the exposures on the island only consist of Upper Ordovician (Ashgill) to Lower Silurian (Llandovery) rocks, with a total thickness of approximately 800 m. The rocks have barely been disturbed by the regional tectonic events (Taconic and Acadian Orogenies). Beds have a slight southwesterly dip of about 0.2 to 2.0° and there are rare minor faults present that displace the rocks by only a few meters (Jin, 1989).

The Upper Ordovician and Lower Silurian sequence of Anticosti Island is divided into seven formations (See Figure 2). The two in the Upper Ordovician are the Vauréal and the Ellis Bay formations. The Vauréal Formation contains the oldest exposed rocks and is exposed on the north side of the island. It is 750 m thick and consists of interbedded micrite, calcarenite, and micritic mudstone. There are six members recognized in this formation but only the top two (Mill Bay and Schmitt Creek members) have been formalized (Jin and Copper, 2000).

The Ellis Bay Formation is approximately 50-65 m thick and consists of limestone, shale, and some minor sandstone. There are intraformational conglomerates that are generally scarce, and the sandstones disappear west of the island center. This formation is richly fossiliferous with a high diversity and abundant megafauna. This formation is subdivided into five members, in ascending order they are the: Grindstone, Velleda, Prinsta, Lousy Cove, and Laframboise members. These members are traceable

as lithologic units for more than 200 km along the east-west outcrop belt. The fauna indicates the entire Ellis Bay Formation is of Hirnantian age. This fauna includes: brachiopods, conodonts, stromatoporids, corals, crinoids, and trilobites. This formation also represents the thickest and most complete post-Richmondian section in eastern North America (Jin and Copper, 2000).

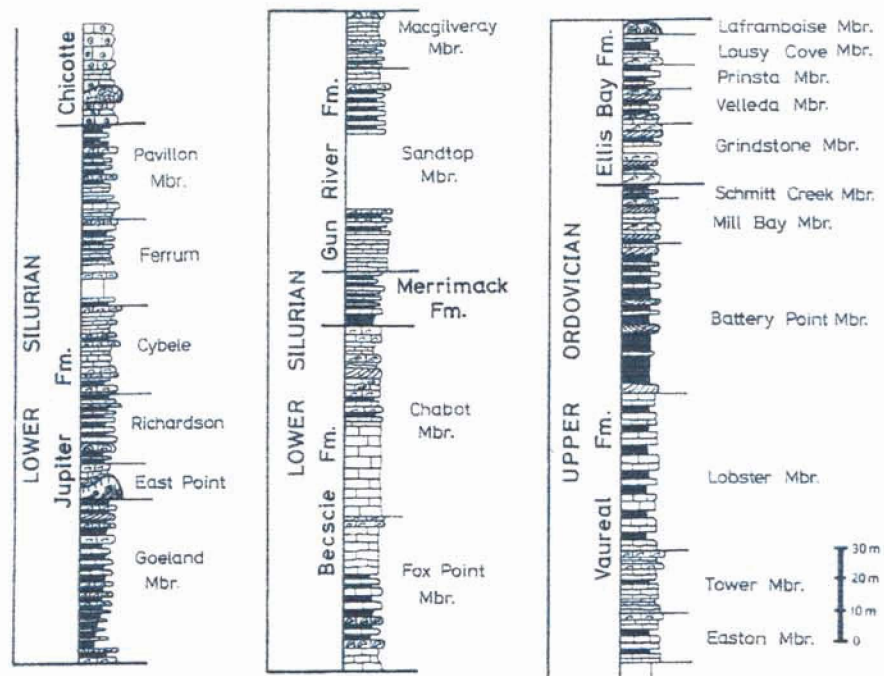


Figure 2. Complete geological section of the Upper Ordovician-Lower Silurian sequence of Anticosti Island. Siliciclastic rocks (with dots and ripple marks occur mainly in the upper Vauréal and Ellis Bay formations. Coral-algal-stromatoporoid bioherms occur within limestones (brick symbols) and calcareous shales (black) of the Laframboise Member (Ellis Bay Formation), East Point Member (Jupiter Formation), and Babineau Member (Chicotte Formation). Total thickness of the complete section, as measured from various types sections is less than the maximum thickness of the sequence. Taken from Jin, 1989.

The Grindstone and Velleda members are predominantly siliciclastic sandstone, siltstone, and claystone, with minor calcareous mudstone (Jin and Copper, 2000). The Prinista and Lousy Cove members are recessive weathering units, fossiliferous, laminated, nodular micrite and shale. The Laframboise Member is mainly a coral-stromatoporoid-calcimicrobial patch reef, a bryozoan-rich skeletal packstone, floatstone, and grainstone, and an oncolite grainstone. The Ordovician-Silurian boundary is placed at the top of the

Laframboise Member on the basis that the last Ordovician invertebrate megafauna occur within this distinctive weathering-resistant unit (Jin and Copper, 2000).

The third formation, the Bescie Formation, marks the beginning of the Silurian. It is split informally into two units, the Fox Point and Chabot members. The lower Fox Point Member consists of irregularly and lenticularly bedded and ripple-marked calcareous grainstones of high-energy. The upper Chabot Member has abundant thick and massive bedded biogenic grainstones and some intraformational conglomerates. Both members are of inner to middle shelf origin, but the Chabot Member has a richer and more diverse fauna (Jin and Copper, 2000).

The second formation in the Silurian is the Merrimack Formation, which is about 30 m thick. It was originally included within the Bescie Formation but was separated out by Copper and Long (1989). It consists of recessive calcareous shale, with minor interbeds of micrites and calcarenites of distal storm origin (Jin and Copper, 2000). The invertebrate fauna is dominated by a plentiful collection of deeper water brachiopods including the very large rhynchonellid *Fenestrirostra*, and *Rhynchotrema*, athyrids, atrypids, orthids, strophomenids, solitary rugose corals, and tabulates.

The next formation is the Gun River Formation, which was divided into four members by Long and Copper (1994). They are the Lachute, Innommée, Sandtop, and Macgilvray members. The lower part of this formation consists mainly of micritic mudstone of fairly deep-water origin, but toward the top it becomes a shallowing-upward sequence, within the Macgilvray Member. The fauna of the formation is of comparatively low diversity, with small- to medium-sized brachiopods, solitary corals, and small tabulate corals (Jin and Copper, 2000).

The next formation is the Jupiter Formation which was divided into six members. They are the Goéland, East Point, Richardson, Cybèle, Ferrum, and Pavillon members. A period of shallowing-upward began in the Goéland Member and ends in the East Point Member with coral-stromatoporoid-calcimicrobial reefs and crinoidal grainstones. A second cycle begins in the Richardson Member and represents a renewed phase of deepening that is indicated by the lithology that contains a relatively abundant and diverse brachiopod fauna, including: *Gotatrypa*, *Eocoelia*, and *Dicoelosia*, which is only in the upper Richardson Member on Anticosti Island and may represent the deepest water episode during the Early Silurian (Jin and Copper, 2000). The Cybèle Member is more resistant to weathering and features micrites and lesser shales with a quiet water assemblage. The Ferrum and Pavillon members have a diverse brachiopod fauna and mark another increasingly shallowing-up sequence. This second sequence of shallowing-up ends in the Chicotte Formation. The Chicotte Formation is the youngest on the island and is up to 90 m thick. It is characterized by coral-stromatoporoid reefs and crinoidal grainstones.

#### *Previous Interest*

The first to explore Anticosti Island geologically, stratigraphically, and paleontologically were James Richardson (1857) and Elkanah Billings (1857). Richardson (1857) established the foundation of the Upper Ordovician and Lower Silurian stratigraphy. He recognized six divisions that he numbered A to F in sequence. Billings (1857) described the first fossils that were collected by Richardson. He also described and illustrated numerous of brachiopods between 1859 and 1874 (Jin and Copper, 2000).



During the early twentieth century Schuchert and Twenhofel established the basic modern stratigraphy of the island by giving formal formation names to the rock divisions (Jin and Copper, 2000). They recognized three formations in the Upper Ordovician sequence and named them the English Head, Carlton, and Ellis Bay formations. The lower two formations are now known as the Vauréal Formation. They also divided the Lower Silurian sequence into formations and named them the Becscie, Gun River, Jupiter, and Chicotte formations. The formational boundaries have been slightly modified over the years, but remain relatively the same (Jin and Copper, 2000). In later years, Twenhofel focused on the paleontology of the island which led to his comprehensive, classic work on the geology of Anticosti Island (Twenhofel, 1928).

In the past fifty years there has been a renewal of interest in the island. Bolton (1961, 1966) revised some of the stratigraphy on the western and central part of the island. He also measured the first inland sections because more roads were being built at this time by the logging company (Jin and Copper, 2000). There has also been a renewal of interest in the brachiopods by Copper (1973, 1977, 1981, 1995), Jin (1989), Dewing (1999), and Jin and Copper (1997, 1998, 1999, 2000). These studies focused more on the taxonomy, paleoecology, biostratigraphy, and paleobiology of the orthids, pentamerids, strophomenids, and most of the rhynchonellids (Jin and Copper, 2000). Most of the orthids, athyrids, atrypids, and spiriferids have yet to be studied. There are present studies being done on these major taxonomic brachiopod groups of Anticosti Island.

This paper compares the brachiopod communities determined by Ziegler, Cocks, and Bambach (1968) to those found on Anticosti Island. The communities found on

Anticosti Island were determined from the collections made by W. I. Ausich in the summers of 1998, 2001, and 2002.

This paper also discusses this same collection systematically. The corals and brachiopods were identified and described. Six coral species and 33 species of brachiopods were identified.

## BRACHIOPOD COMMUNITIES

Five basic brachiopod communities were defined by Ziegler, Cocks, and Bambach (1968), based on faunas from Wales. These are, in increasing distance from shore, the: *Lingula* Community, *Eocoelia* Community, *Pentamerus* Community, *Costistricklandia* Community, and the *Clorinda* Community. The *Lingula* Community is the least diverse, and its species represent a wide range of adaptive types. A rhynchonellid is the only abundant articulate brachiopod. This community was from a sandstone bed and, therefore, lived in near-shore conditions. The *Eocoelia* Community is more diverse than the *Lingula* Community but contains many of the same elements. This community was from alternating fine-grained sandstone beds and shale. It most probably inhabited a near-shore environment, as well, but with more open marine conditions. The *Pentamerus* Community has a composition intermediate between the *Eocoelia* and *Costistricklandia* Communities and probably occupied an environment between them as well. This community has a lithology that is dominantly shale, with some sandstone beds. The *Costistricklandia* Community probably inhabited an environment slightly deeper than the *Pentamerus* Community. This community was from greenish fine-grained sandstone that alternated equally with shale. The *Clorinda* Community is the

most diverse of the five communities. Pentamerids are absent in this community. It was from grey cleaved mudstones, so this community most probably represents quiet off-shore conditions.

On Anticosti Island the brachiopod communities are somewhat different from the Welch communities of Ziegler, Cocks, and Bambach (1968). Because, the collection used for this paper was not a census of the entire island, the communities determined from this collection may be biased. The *Lingula* Community does not seem to exist on Anticosti. There are no communities from sandstones, and no *Lingula* specimens in this collection. The same is true for the *Eocoelia* Community. However, some *Eocoelia* specimens were found, but these did not occur in sandstone. The Anticosti *Pentamerus* Community remains approximately the same as in Wales, although the Anticosti *Pentamerus* Community probably inhabited slightly deeper water than the *Pentamerus* Community determined by Ziegler, Cocks, and Bambach (1968). The *Costistricklandia* Community is similar but is named the Stricklandiid community on Anticosti (Jin and Copper, 1999). Similarly the deep-water *Clorinda* Community is renamed *Dicoelosia* Community for the deep-water Anticosti communities.

The *Pentamerus* Community of Anticosti Island is fairly diverse. Some species associated with *Pentamerus* are *Hyattidina junea*, *Stegerhynchus peneborealis*, *Triplesia anticostiensis*, and *Coolinia pecten*. There were two *Pentamerus* species present, *Pentamerus oblongus* from the Ferrum Member and *Pentamerus palaformis* from the Goéland Member, both in the Jupiter Formation. In a bluish-grey mudstone unit in the lower Goéland Member shell beds are dominated by *Pentamerus palaformis* preserved in life position, hinting that this community inhabited a deeper, more quiet setting than that

of Ziegler's *Pentamerus* Community of Wales (Jin and Copper, 1999), which consisted predominantly of shale interbedded with fine-grained sandstone (Ziegler, Cocks, and Bambach, 1968).

The Stricklandiid community consists of two stricklandiids, *Ehlersella davidsonii* and *Microcardinalia* sp. There was also one rhynchonellid, *Platyrochalos crudicostatus*. This Anticosti Island community occurred predominantly in thinly-bedded, soft grey micrites and shale, which indicate a more quiet-water setting. No specimens were collected in a sandstone lithology.

The *Dicoelosia* Community of Anticosti has a high diversity. Some of the associated species are *Gotatrypa* sp., small-shelled *Resserella* sp., *Eoplecodonta* (*Ygerodiscus*) *striatocostatus*, *Eocoelia hemisphaerica*, *Stegerhynchus peneborealis*, and *Brachyprion leda*. This community is only in the Richardson Member of the Jupiter Formation, which some believe (Jin and Copper, 1999) represent the deepest water recorded in the Anticosti Basin at this time. The lithology of this community is mainly clayey-weathering bluish-grey mudstone, which points to a deep quiet-water setting.

There may be other communities on Anticosti Island and the ones determined may require revision, because the present collection is not comprehensive and because it does not include samples from the entire island. Also note that these communities are only for the Early Silurian of Anticosti Island.

## SYSTEMATIC PALEONTOLOGY

This is a systematic paleontology of the corals and brachiopods collected by W. I. Ausich in the summers of 1998, 2001, and 2002. The localities designated with an A are

the Paul Copper localities. All localities designated with a date and a number were designated by Ausich. The fossils were deposited in the Orton Geological Museum.

Phylum COELENTERATA Frey and Leuckart, 1847  
 Subphylum CNIDARIA Hatschek, 1888  
 Class ANTHOZOA Ehrenberg, 1834  
 Subclass TABULATA Milne-Edwards and Haime, 1850  
 Order HELIOLITIDA Frech, 1897  
 Superfamily PROPORICAE Sokolov, 1949  
 Family PROPORIDAE Sokolov, 1949  
 Genus PROPORA Milne-Edwards and Haime, 1849  
 PROPORA NUMMULOSA (Twenhofel, 1914)

*Discussion.* - Specific characters for *Propora nummulosa* are a coin-shaped corallum with a maximum diameter of 25 mm, and a thickness of 2 to 3 mm. The upper side is convex and the lower side is concave and is covered with concentrically striated and wrinkled epitheca. The calices are arranged in definite rows that cross each other in three directions. The walls of the corallite are crenulated so that there are 12 infolds that appear as small nodes. This particular specimen is 16 mm in diameter and 3 mm thick, with 2 to 3 tabulae present in the intervening spaces.

*Occurrence.* - Locality: A84-coastal section south of Junction Cliff (Parastrophinella Bluff). Velleda Member, Ellis Bay Formation, Hirnantian, Ordovician; Anticosti Island, Quebec, Canada.

Suborder HALYSITINA Sokolov, 1949  
 Family HALYSITIDAE Milne-Edwards and Haime, 1849  
 Subfamily HALYSITINAE Milne-Edwards and Haime, 1849  
 Genus HALYSITES Fischer von Waldheim, 1828  
 HALYSITES sp.

*Discussion.* - This chain coral has a corallum with corallites rounded to elliptical in section, with thick walls and complete tabulae. The septal ridges or septal spines are

weakly developed to absent. Corallites within ranks are separated by a single prismatic coenenchymal tubule that is quadrangular and either square or oblong in section. This particular specimen clearly contains the coenenchymal tubules, which identifies it as a *Halysites*, but it is not identifiable to species.

*Occurrence.* – Locality: A1443-stream section about 700 m south of the major fork in Brick River. Middle Cybele Member, Jupiter Formation, Telychian, Silurian; Anticosti Island, Quebec, Canada.

Subfamily CATENIPORINAE Hamada, 1957

Genus CATENIPORA Lamarck, 1816

CATENIPORA sp. A

*Discussion.* – This chain coral had corallites of each rank elongate and elliptical or angulate. They are elliptical in section without the coenenchymal tubules that *Halysites* has. Offsets may arise from either edge of a corallite. The septal spines occur in twelve longitudinal rows and are commonly well-developed. The tabulae are mostly horizontal. In this specimen the corallites are larger than in *Catenipora* sp. B.

*Occurrence.* – Locality: A1274-1.7 km east of Bell River Road on the Main Road; A1489-0.1 km north of the Main Road on the Road 3.7 km East of Bell River Road. East Point Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

CATENIPORA sp. B

*Discussion.* – *Catenipora* sp. B is very similar to *Catenipora* sp. A, but it has smaller corallites and the tabulae are less horizontal.

*Occurrence.* – Locality: A1275-1.9 km east of Bell River Road on the Main Road. East Point Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Order FAVOSITIDA Wedekind, 1937  
 Suborder FAVOSITINA Wedekind, 1937  
 Superfamily FAVOSITICAE Dana, 1846  
 Family FAVOSITIDAE Dana, 1846  
 Subfamily FAVOSITINAE Dana, 1846  
 Genus FAVOSITES Lamarck, 1816  
 FAVOSITES FAVOSUS (Goldfuss, 1826)

*Discussion.* – The specific characteristics for *Favosites* are prismatic, thin-walled corallites. With the septa commonly represented by longitudinal rows of spines. The tabulae are complete and subhorizontal. There are mural pores on corallite faces in one to four longitudinal rows. The specific characteristics for *Favosites favosus* are corallites 5 to 6mm in diameter, with thick, gently convex tabulae.

*Occurrence.* – Locality: A1500-Dauphiné Creek Road, 14 km from Dauphiné Cabin Road. Lower Cybele Member, Jupiter Formation, Telychian, Silurian; Anticosti Island, Quebec, Canada.

Subfamily PALEOFAVOSITINAE Sokolov, 1949  
 Genus PALEOFAVOSITES Twenhofel, 1914  
 PALEOFAVOSITES ASPER (d'Orbigny, 1850)

*Discussion.* – The specific characteristics for *Paleofavosites* are a massive corallum and thin-walled, prismatic corallites. There are mural pores at the edges of the faces of the prisms, alternating in position on either side of the angle giving a characteristic wavy appearance in a longitudinal section through an angle. The septa are each represented by a longitudinal row of discrete spines directed upward and inward.

The tabulae are thin, commonly complete, and subhorizontal. The specific characteristics of *Paleofavosites favosus* are abundant septal spines and abundant mural pores.

*Occurrence.* – Locality: A1490-4.3 km east of Bell River Road, on the Main Road. Richardson Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Phylum BRACHIOPODA Duméril, 1806  
Subphylum RHYNCHONELLIFORMEA Williams and Others, 1996  
Class STROPHOMENATA Williams and Others, 1996  
Order STROPHOMENIDA Öpik, 1934  
Superfamily STROPHOMENOIDEA King, 1846  
Family RAFINESQUINIDAE Schuchert, 1893  
Subfamily LEPTAENINAE Hall & Clark, 1894  
Genus LEPTAENA Dalman, 1828  
Subgenus LEPTAENA (LEPTAENA) Dalman, 1828  
LEPTAENA (LEPTAENA) sp.?

*Discussion.* - Specific characteristics for *Leptaena* make this specimen easily identifiable. It has a transverse outline, is rounded anteriorly, and has a concavo-convex profile with sharp anterior dorsal geniculation. It also has ornament costellate and well developed concentric rugae. The species could not be assigned because this specimen was found in the Gun River Formation, and according to Dewing (1999) no *Leptaena* have been found in the Gun River Formation. However, there have been several species found in the Jupiter Formation, *Leptaena* cf. *L. valida* (Dewing, 1999). This specimen is one slab containing three *Leptaena* brachiopods.

*Occurrence.* - Locality: LaLoutre Road, 6.5 km south of the Main Road. Gun River Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

LEPTAENA (LEPTAENA) QUADRILATERA Shaler, 1865



*Discussion.* - Only one species of *Leptaena* was found in the Ellis Bay Formation, *Leptaena (Leptaena) quadrilatera* (Dewing, 1999). This specimen was very fragmented, but it can be identified as *Leptaena* because it has the basic characteristics of *Leptaena*: concentric rugae, concavo-convex profile, and the ornament costellate. The species assignment is inferred.

*Occurrence.* - Locality: A84-coastal section south of Junction Cliff (Parastrophinella Bluff). Velleda Member, Ellis Bay Formation, Hirnantian, Ordovician; Anticosti Island, Quebec, Canada.

Family LEPTOSTROPHIIDAE Caster, 1939  
Genus BRACHYPRION Shaler, 1865  
BRACHYPRION LEDA (Billings, 1859)

*Discussion.* - Specific characteristics are a small to medium shell size, which is transversely subelliptical to semicircular in outline. The ventral valve is strongly and evenly convex to weakly geniculate in later profile. The dorsal valve is evenly concave to weakly geniculate. The hinge is long, strophic, and forms the maximum width of the shell, ending in strongly alate cardinal extremities. The ventral beak is minute with the foramen absent. The interarea is apsacline and smooth, up to 1 mm high at the beak. The interior edge of the interarea projects as a small ridge above the flanks and is broken by a small, apical pseudodeltidium. Shell measurements in millimeters are as follows:

	Average	Maximum	Minimum	N
Length	8.7	11.0	6.5	6
Width	11.7	13.5	9.0	6
Thickness	2.6	3.8	2.0	6

*Occurrence.* - Locality: A1288c-Dauphiné Road, southeast of the junction with Winter Road (about halfway between the junction and 90° bend) at River, A924-Dicoelosia Creek, 10 km from the tributary bridge on Dauphiné Creek Road. Goéland Member-Richardson Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Superfamily PLECTAMBONITOIDEA Jones, 1928  
 Family SOWYERBELLIDAE Öpik, 1930  
 Subfamily SOWYERBELLINAE Öpik, 1930  
 Genus EOPLECODONTA Kozłowski, 1929  
 Subgenus EOPLECODONTA (YGERODISCUS) Havlíček, 1967  
 EOPLECODONTA (YGERODISCUS) STRIATOCOSTATUS (Twenhofel, 1928)

*Discussion.* – Specific characteristics are a small shell that is transversely elliptical to triangular in outline and is strongly concavo-convex in lateral profile. The hinge line is long and strophic and forms the maximum width of the shell, ending in weakly alate cardinal extremities. The ornamentation is unequally parvicostellate, with seven to nine major costae on raised, sharp ribs that are separated by smaller costellae on the dorsal valve. The ventral beak is small, with an orthocline interarea that is concave with a tiny apical pseudodeltidium extending into the delthyrial cavity as a pedicle callist. The apical foramen is absent. Shell measurements in millimeters are as follows:

	Average	Maximum	Minimum	N
Length	8.5	11.5	7.0	20
Width	12.9	16.0	10.0	20
Thickness	3.9	5.0	2.0	19

*Occurrence.* - Locality: A924-*Dicoelosia* Creek, 10 km from the tributary bridge on Dauphiné Creek Road. Richardson Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Order ORTHOTETIDA Waagen, 1884  
 Suborder ORTHOTETIDINA Waagen, 1884  
 Superfamily CHILIDIOPSOIDEA Boucot, 1959  
 Family CHILIDIOPSIDAE Boucot, 1959  
 Subfamily CHILIDIOPSINAE Boucot, 1959  
 Genus COOLINIA Bancroft, 1949  
 COOLINIA PECTEN (Linnaeus, 1758)

*Discussion.* – Specific characteristics include a medium to large shell size, and a transversely subelliptical to subrectangular shape in outline. The ventral valve is respuniate in lateral profile and is gently convex posteriorly, becoming planar to concave anteriorly and flattened laterally. The ventral beak is small and flush with the hinge line. The dorsal valve is gently and uniformly convex along the median plane. The dorsal beak is flush with the interarea. The hinge is strophic and terminates in weakly alate cardinal extremities. The anterior commissure is crenulated and gently uniplicate. The ornamentation is equally parvicostellate, with close-spaced, fine, concentric growth filae that cover the entire shell. There were only three loose specimens, the rest were imbedded in slabs. The preservation was decent, and one could easily make out the distinguishing features for *Coolinia pecten*.

*Occurrence.* - Locality: A1264-300 m from tributary bridge on Dauphiné Creek Road; A1455-Dauphiné Creek Road 1.8 km from Dauphiné Cabin Road; Dauphiné Creek Road, 2.8 km from Dauphiné Cabin Road; 1.8 km past Sandtop Road and 55.8 km east of Bell River Road on the Main Road. Goéland Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Suborder TRIPLESIIDINA Moore, 1952  
Superfamily TRIPLESIOIDEA Schuchert, 1913(a)  
Family TRIPLESIIDAE Schuchert, 1913(a)  
Genus TRIPLESIA Hall, 1859  
TRIPLESIA ANTICOSTIENSIS Twenhofel, 1914

*Discussion.* – There was only a small specimen partially imbedded in a small slab, but the distinguishing features are still visible. It is strongly trilobite with a pronounced dorsal fold and a corresponding ventral sulcus. The surface is smooth with only faint growth lines.

*Occurrence.* - Locality: A1468-Main Sandtop Road at Dauphiné west of south branch. Goéland Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Order BILLINGSELLIDA Schuchert, 1893  
Suborder CLITAMBONITIDINA Öpik, 1934  
Superfamily CLITAMBONITOIDEA Winchell & Schuchert, 1893  
Family CLITAMBONITIDAE Winchell & Schuchert, 1893  
Genus VELLAMO Öpik, 1930  
VELLAMO DIVERSA (Shaler, 1865)

*Discussion.* – Specific characteristics are a high subpyramidal ventral and flat to gently convex dorsal valves, and it is commonly asymmetrical. It also has a distinctive large triangular interarea and delthyrium. There was only one specimen for this species. It is common in the Ellis Bay Formation.

*Occurrence.* - Locality: A425- side road south of Main Road, parallel to airport. Grindstone Member, Ellis Bay Formation, Hirnantian, Ordovician; Anticosti Island, Quebec, Canada.

Class RHYNCHONELLATA Williams & Others, 1996  
Order ORTHIDA Schuchert and Cooper, 1932

Suborder ORTHIDINA Schuchert and Cooper, 1932  
 Superfamily ORTHOIDEA Woodward, 1852  
 Family HESPERORTHIDAE Schuchert and Cooper, 1931  
 Genus HESPERORTHIS Schuchert and Cooper, 1931  
 HESPERORTHIS LAURENTINA (Billings, 1857)

*Discussion.* – This species is commonly associated with *Parastrophinella* in the Ellis Bay Formation. Its shell is medium to large in size and elongately-semioval in shape, with cardinal extremities and a straight hinge line. They are planoconvex and rectimarginate with costae. The delthyrium has an apical plate and the interareas are relatively long and flat. There were only two fragmented specimens found, but its association with *Parastrophinella* and the visible features identify this as *Hesperorthis*.

*Occurrence.* - Locality: A84-coastal section south of Junction Cliff (*Parastrophinella* Bluff). Velleda Member, Ellis Bay Formation, Hirnantian, Ordovician; Anticosti Island, Quebec, Canada.

Superfamily PLECTORTHOIDEA Schuchert and LeVene, 1929(a)  
 Family PLECTORTHIDAE Schuchert and LeVene, 1929(a)  
 Genus HEBERTELLA Hall and Clark, 1892  
 HEBERTELLA MARIA (Billings, 1857)

*Discussion.* – The shells of *Hebertella maria* are transversely oblong, with a hinge line equal to or a little less than the greatest width, and cardinal angles that are rectangular or moderately rounded. The sides are gently convex and subparallel with the anterior angle rounded. The ventral valve is flat or gently concave and pyramidal, with a small, pointed beak that is not incurved. The dorsal valve is strongly convex, with the front much more elevated in the middle. The umbo is large, obtusely rounded, and overhangs the hinge line, with a very small but distinct beak. The foramen of the ventral valve is triangular, and the anterior commissure can be straight or gently curved. In total

23 specimens were found, they all have fine radiating striae on their surface becoming finer toward the cardinal angles. These specimens all have the defining characteristics of *Hebertella maria*.

*Occurrence.* - Locality: A425-side road south of the Main Road and parallel to the airport; A84-coastal section south of Junction Cliff (*Parastrophinella* Bluff). Grindstone and Velleda Members, Ellis Bay Formation, Hirnantian, Ordovician; Anticosti Island, Quebec, Canada.

Family PLATYSTROPHIIDAE Schuchert and LeVene, 1929(b)

Genus PLATYSTROPHIA King, 1850

PLATYSTROPHIA REGULARIS Shaler, 1865

*Discussion.* - The shells of *Platystrophia* are generally large and spiriferoid in outline with rectangular to slightly rounded cardinal extremities. The hinge line is a little longer than the average width and is straight. The shells are strongly biconvex and have pointed costae. The ventral beak is commonly resorbed with the apical foramen. There is a large fold that generally has three costae and a corresponding sulcus with two costae. There were eleven specimens found.

*Occurrence.* - Locality: A425-side road south of Main Road, parallel to Airport; A84-coastal section south of Junction Cliff (*Parastrophinella* Bluff). Velleda and Grindstone Members, Ellis Bay Formation, Hirnantian, Ordovician; Anticosti Island, Quebec, Canada.

Suborder DALMANELLIDINA Moore, 1952

Superfamily DALMANELLOIDEA Schuchert, 1913(b)

Family DALMANELLIDAE Schuchert, 1913(b)

Subfamily RESSERELLINAE Walmsley and Boucot, 1971

Genus RESSERELLA Bancroft, 1928

RESSERELLA sp.

*Discussion.* – This species is commonly associated with *Dicoelosia* at this site, it is considered to be the second most common species at this site (Jin and Copper, 1999). The shells are planoconvex to ventribiconvex and transversely semioval or shield-shaped to subcircular. It has a prominent ventral umbo that the beak rises above. It is multicostellate with asymmetrical branched median ribs. The growth lines toward the anterior end are more prominent. There were over 200 specimens collected, most in fair condition. Some were just half of a brachiopod, and internal features could be seen. The dorsal muscle field is confined by variably developed ridges and divided by a median ridge. The cardinal process is bilobed, and there are also recessive dental plates. The ventral muscle scar is suboval.

*Occurrence.* - Locality: A924-*Dicoelosia* Creek, 10 km from the tributary bridge on Dauphiné Creek Road. Richardson Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Family DICOELOSIIDAE Cloud, 1948

Genus DICOELOSIA King, 1850

DICOELOSIA DAUPHINENSIS Jin and Copper, 1999

*Discussion.* – This bilobed species is relatively large, with moderately elongate shells and a wide hinge line. It is concavo-convex in lateral profile with subparallel lateral margins. The lobes are commonly broad, attaining less than one third of the shell length and are planoconvex and very strongly ventribiconvex in cross section. The cardinal extremities are angular to subangular extending into small ears in some specimens. The anterior commissure is rectimarginate. The ventral valve is relatively convex and deep, divided into two lobes by a deep sulcus from the apex to the anterior

margin. The greatest valve convexity is located along the crest of each lobe becoming flattened toward the cardinal extremities. The ventral umbo is moderately to strongly convex and strongly sulcate with a minute, suberect beak. The interarea is as wide as the hinge line. The delthyrium is generally higher than wide and is entirely open. The dorsal valve has an overall concave curvature longitudinally and is divided into two lobes by a shallow and relatively broad sulcus with each lobe being flat to weakly convex in cross-section. The dorsal umbonal area is nearly flat to weakly convex. The dorsal interarea is anacline and noticeably lower than the ventral interarea. The shell costae are fine and are strongest along the crest of each lobe and weakest in the sulcus and toward the cardinal extremities. The growth lines or lamellae are well-developed especially on the anterior end of the shell. Most of the specimens are in small slabs of rock that contain many other fossils, such as bryozoans, trilobites, corals, and other brachiopods. One specimen is attached to a *Gotatrypa* sp. And two other specimens are loose but are in poor condition. This is a fairly rare species on Anticosti Island and is very limited in its distribution.

*Occurrence.* - Locality: A924-*Dicoelosia* Creek, 10 km from the tributary bridge on Dauphiné Creek Road. Richardson Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Family RHIPIDOMELLIDAE Schuchert, 1913(a)  
Genus MENDACELLA Cooper, 1930  
MENDACELLA UBERIS (Billings, 1866)

*Discussion.* - This is the type species for this genus. The valves are ventribiconvex and rectimarginate. The cardinal process is small and the feature characteristics are mainly internal. There may or may not be a fold and sulcus with



ornamental ribs. There were only two specimens and one was partly covered by sediment and only partly visible, which made the identification difficult.

*Occurrence.* - Locality: 28.9 km east of Bell River Road, on Main Road. Merrimack Formation, Rhuddanian, Silurian; Anticosti Island, Quebec, Canada.

Order PENTAMERIDA Schuchert and Cooper, 1931  
Suborder SYNTROPHIIDINA Ulrich & Cooper, 1936  
Superfamily CAMERELLOIDEA Hall & Clark, 1894  
Family PARASTROPHINIDAE Schuchert & LeVene, 1929(b)  
Genus PARASTROPHINELLA Schuchert & Cooper, 1931  
PARASTROPHINELLA REVERSA (Billings, 1857)

*Discussion.* - The shells in *Parastrophinella reversa* are relatively small, transversely subelliptical, and dorsibiconvex. The hinge line is weakly curved with rounded cardinal extremities. The anterior commissure is denticulate and broadly uniplicate. The ventral umbo is low, weakly to moderately convex, with a small suberect beak raising about 1 mm above the hinge line. The interarea is low and the delthyrium is small and devoid of any deltidal covering. The sulcus begins immediately anterior to the umbo and widens, and deepens rapidly anteriorly and bears two to five rounded costae. The dorsal umbo is higher and more strongly convex than the ventral umbo, with the beak arched over the commissural plane and into the delthyrial cavity. The fold is generally low and defined on each side by prominent costa and bears a total of three to six rounded costae. The umbonal portions of both valves are commonly smooth and rarely marked by weak costae, with well developed growth lines. There were 41 specimens found. This species is most commonly found near Junction Cliff, and the locality was given the name *Parastrophinella* Bluff.

*Occurrence.* - Locality: A84-coastal sections south of Junction Cliff  
(*Parastrophinella* bluff). Velleda Member, Ellis Bay Formation, Hirnantian, Ordovician;  
Anticosti Island, Quebec, Canada.

Suborder PENTAMERIDINA Schuchert and Cooper, 1931  
Superfamily PENTAMEROIDEA M'Coy, 1844  
Family PENTAMERIDAE M'Coy, 1844  
Genus PENTAMERUS J. Sowerby, 1813  
PENTAMERUS OBLONGUS J. de C. Sowerby, 1839

*Discussion.* - The specific characteristics for this species are a medium to very large shell size. The shells are commonly smooth or faintly plicate in small numbers of specimens. It is elongate, strongly and almost equally biconvex, and prominently trilobate with a median lobe strongly protruding at the anterior margin. The hinge line is slightly curved and is about 2/3 of the shell width. The ventral umbo is high, strongly convex, relatively narrow, and extends 4-6 mm above the hinge line in specimens of average size. The beak is strongly arched and appressed onto the dorsal umbo. The delthyrium is covered apically by a thin concave pseudodeltidium. A ventral fold or sulcus is absent but the median lobe becomes strongly elevated and is bordered by a pair of grooves. The dorsal umbo is moderately convex with a small beak buried in the delthyrial cavity. A dorsal fold or sulcus is absent here as well. The median septum is sometimes visible through the shell distinguishing it as a pentamerid. There are two specimens. Neither is perfect, but they are distinguishable from *P. palaformis* by its age. *P. oblongus* occurs in the upper Jupiter Formation, and *P. palaformis* occurs mainly in the lower Jupiter Formation. It also has a more strongly elongate convex shell with a more pronounced trilobation, a more strongly protruding median lobe at the anterior

margin, and a more pointed ventral umbo than *P. palaformis*. This is the type species for this genus.

*Occurrence.* - Locality: 7-9-02-3. Ferrum Member, Jupiter Formation, Telychian, Silurian; Anticosti Island, Quebec, Canada.

#### PENTAMERUS PALAFORMIS Jin and Copper, 2000

*Discussion.* - The shell for *P. palaformis* is medium to very large, and is generally transverse but very large forms become elongate. Shell measurements in millimeters are as follows:

	Average	Maximum	Minimum	N
Length	32.4	68.0	6.0	56
Width	33.7	62.0	5.8	55
Thickness	18.1	36.0	3.8	52

Most shells are transversely subelliptical, subpentagonal, or subtriangular in outline. The shells are moderately biconvex in medium specimens to strongly convex in very large forms. The hinge line is weakly curved occupying 1/2 to 2/3 of the shell width. The anterior commissure is rectimarginate to broadly wavy reflecting trilobation. There is a median lobe protruding moderately at the anterior margin in medium sized shells but strongly in very large ones. The ventral umbo is broad and strongly convex, with an arched beak that is appressed onto the dorsal umbo. The delthyrium is covered by the incurved beak, and the concave pseudodeltidium covers the posterior portion of the delthyrium. The umbonal portion is smooth and contoured, devoid of fold and sulcus, or lobation. The dorsal umbo is moderately convex in medium-sized specimens to strongly convex in very large specimens. The beak is buried in the delthyrial cavity. The surface

of both valves is smooth and faintly plicate anteriorly in small numbers of specimens. The growth lines are very fine, and the medial septum is visible in some specimens distinguishing this as a pentamerid. *P. palaformis* is found only in the lower Jupiter Formation. One specimen is split in half laterally, and the brachidium is visible and well preserved with fine growth lines.

*Occurrence.* - Localities: 7-6-01-1; A1468- Main Road intersection with the North Branch of Dauphiné Creek; A1455- Dauphiné Creek Road, 1.8 km from Dauphiné Cabin Road; A1264- 300 m from the tributary bridge on Dauphiné Creek Road; 1.1 km past Sandtop Road, and 55.1 km East of Bell River Road on the Main Road; A1493-8.6 km east of Bell River Road on the Main Road. Goéland Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Superfamily STRICKLANDIOIDEA Schuchert & Cooper, 1931  
 Family STRICKLANDIIDAE Hall & Clark, 1894  
 Subfamily STRICKLANDIINAE Schuchert & Cooper, 1931  
 Genus EHLERSELLA Boucot & Johnson, 1966  
*EHLERSELLA DAVIDSONII* (Billings, 1866)

*Discussion.* – The shell size is medium to large and moderately elongate to cylindrical, suboval to subrhomboidal in outline, and strongly equibiconvex. Shell measurements in millimeters are as follows:

	Average	Maximum	Minimum	N
Length	45.4	54.0	33.0	10
Width	38.1	46.0	31.0	10
Thickness	19.4	28.0	11.5	10

The hinge line is straight to slightly curved. The cardinal extremities are rounded and the anterior commissure is gently uniplicate. The ventral umbo is rounded, extending above

the hinge line for 2-3 mm. It is uniformly convex or bears a shallow median furrow, with a small, strongly incurved beak appressed onto the dorsal umbo. The ventral interarea is poorly defined. The delthyrium is obscured by the dorsal beak area and lacks a pseudodeltidium. The ventral fold or sulcus is absent. There is a medial portion more strongly elevated (carinate) than the lateral portions in some specimens. The dorsal umbo is nearly convex and slightly lower than the ventral umbo, and the dorsal interarea is poorly developed or absent. The dorsal valve is moderately to strongly trilobate. The shell surfaces in most species are smooth or faintly plicate, and some others bear low, rounded, chevron-like costae on the anterior 2/3 of both valves. *Ehlersella* is differentiated from the very similar *Stricklandia* by a fold-like medial ridge on both the ventral and dorsal valves. The specimens collected here have a few costae, but none are noticeable or well-preserved. Most of the shells are just fragments, but they are still discernible as *Ehlersella*. There is also one sample that has a few specimens of *Ehlersella* held together and most are broken open. Inside them are calcite and barite and this gives a geopetal orientation.

*Occurrence.* - Localities: A1430-stream section about 500 m east of the major fork in Brick River; A1434-stream section immediately west of the major fork in Brick River; A1442-stream section about 400 m south of the major fork in Brick River; A1443-stream section about 700 m south of major fork in Brick River; A1462-south of Dauphiné Road on Box Road. Cybele Member, Jupiter Formation, Telychian, Silurian; Anticosti Island, Quebec, Canada.

Subfamily KULUMBELLINAE Boucot, Rong, and Blodgett, 2000  
 Genus MICROCARDINALIA Boucot and Ehlers, 1963  
 Subgenus MICROCARDINALIA (DAUPHINELLA) Jin and Copper, 2000

## MICROCARDINALIA (DAUPHINELLA) DIVARICATA Jin and Copper, 2000

*Discussion.* – The shell is generally large, subcircular and equibiconvex. The hinge line is long and covers 2/3 or more of the shell width. The anterior commissure is broadly and gently uniplicate to virtually rectimarginate. The ventral umbo is weakly convex, slightly bulging with a minute beak raised slightly above the hinge line. The interarea is wide, relatively low, and strongly apsacline to nearly catacline with an open delthyrium. The sulcus is generally absent in the umbonal area but becomes well-defined anteriorly in some specimens. The dorsal interarea has a minute beak as well, arched over the hinge line to partly cover the ventral interarea and delthyrium. The fold is absent or very low in some specimens. There are also chevron-like costae variously developed.

*Occurrence.* - Locality: A1459-Box River section, about 1,100 m north of Dauphiné-Box Road. Uppermost Cybele Member, Jupiter Formation, Telychian, Silurian; Anticosti Island, Quebec, Canada.

## MICROCARDINALIA sp.

*Discussion.* – In *Microcardinalia*, the shell can be small to very large and weakly to moderately biconvex and subcircular to semicircular in outline. It can also be smooth or have various types of weak ribs. The hinge line is long and straight with an apsacline interarea. The ventral umbo and beak are reduced. This specimen is in very poor condition and almost unidentifiable. There are a few distinguishing features, such as the interarea, that helped to identify it as *Microcardinalia*, but it cannot be identified further.

*Occurrence.* - Locality: Firetower #5 Road. East Point Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Order RHYNCHONELLIDA Kuhn, 1949  
 Superfamily RHYNCHOTREMATOIDEA Schuchert, 1913(a)  
 Family RHYNCHOTREMATIDAE Schuchert, 1913(a)  
 Subfamily RHYNCHOTREMATINAE Schuchert, 1913(a)  
 Genus RHYNCHOTREMA Hall, 1860  
 RHYNCHOTREMA FRINGILLA (Billings, 1862)

*Discussion.* – The specific characteristics for this species are a large shell that is subpentagonal to elliptical in outline and nearly equibiconvex in profile. The shell measurements in millimeter are as follows:

	Average	Maximum	Minimum	N
Length	23.1	32.5	2.8	74
Width	26.0	38.4	2.7	74
Thickness	16.5	26.2	1.0	74

The hinge line is weakly curved. The ventral umbo is moderately to uniformly convex with a suberect to incurved beak. The delthyrium is partly covered by a disjunct duplex of deltidal plates. The sulcus is deep and wide with gentle slopes beginning anterior to the umbo and is marked by three simple subrounded costae increasing to five near the anterior margin of some large specimens. The dorsal umbo is moderately to strongly convex with the beak curved into the delthyrial cavity. It has a minute, shallow median furrow that changes to a fold. The fold is low to moderately high and is generally marked by four simple subrounded costae increasing to eight at the anterior margin of large forms. The costae are strong and simple with ten to twelve on each flank and visible growth lines. This species differs from the similar *Fenestrirostra glacialis* by having more triangular costae and a denticulate commissure. This species is commonly found in the Merrimack Formation of Anticosti Island.

*Occurrence.* - Locality: 28.9 km east of Bell River Road, on Main Road.

Merrimack Formation, Rhuddanian, Silurian; Anticosti Island, Quebec, Canada.

Genus STEGERHYNCHUS Foerste, 1909  
STEGERHYNCHUS BOREALIS von Buch, 1834

*Discussion.* - The specific characteristics for this species are a small- to medium-sized shell that is transversely subtriangular to suboval in outline and unequally biconvex in profile. The hinge line is short and curved, and the anterior commissure is strongly denticulate. The ventral umbo is small, narrow, and moderately and uniformly convex. It protrudes above the hinge line with a suberect or incurved beak that is not appressed on to the opposite umbo. The delthyrium is open or with rudimentary deltidal plates. The interarea is small and poorly defined. The sulcus begins anterior to the umbo and becomes wider and deeper anteriorly and contains three simple, subangular costae. The dorsal umbo is moderately convex and is marked by a minute median furrow that changes into a fold anterior of the hinge line. The fold is marked by four strong costae with two occupying the crest and the other two on the slopes. Each shell flank has seven to ten simple costae, and dense growth lines in well-preserved specimens. There were 37 specimens collected for this species.

*Occurrence.* - Locality: 7-6-01-1. Uppermost Goéland Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

STEGERHYNCHUS PENEBOREALIS (Twenhofel, 1928)

*Discussion.* - The specific characteristics for this species are a small- to medium-sized shell that is transversely oval and moderately to strongly biconvex with the dorsal valve deeper than the ventral valve. The hinge line is nearly straight and the anterior



commissure is strongly denticulate. The ventral umbo is narrow and moderately and uniformly convex rising above the hinge line. The beak is suberect in relatively small specimens and incurved but not appressed onto the opposite umbo in adult forms. The delthyrium is open, narrow and triangular, without a clearly defined foramen. The sulcus begins anterior of the umbo and becomes deeper anteriorly with three simple, strong costae. There is a median furrow on the dorsal umbo that changes into a fold anteriorly of the hinge line. Each shell flank has five to seven simple, strong, subangular costae with very fine growth lines. There were 30 specimens collected for this species.

*Occurrence.* - Locality: A1468-Main Road intersection with the North Branch of Dauphiné Creek; A924-*Dicoelosia* Creek, 10 km from the tributary bridge on Dauphiné Creek Road; A1264-300 m from the tributary bridge on Dauphiné Creek Road; A1455-Dauphiné Creek Road, 1.8 km from Dauphiné Cabin Road. Goéland to Richardson Members, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Family LEPTOCOELIIDAE Boucot and Gill, 1956  
 Genus EOCOELIA Nikiforova, 1961  
 EOCOELIA HEMISPHERICA (J. de C. Sowerby, 1839)

*Discussion.* - This is the type species for this genus. The specific characteristics of this species are a subcircular to transversely elliptical outline with a subbiconvex to planoconvex profile. The delthyrium is open. There is a weak ventral fold and dorsal sulcus commonly evident or merely a weak narrow trough on the dorsal valve. The anterior commissure is rectimarginate. The costae are simple, strong and rounded, and extend from the beaks. There were 71 specimens collected for this species. It is commonly associated with *Dicoelosia* in the Richardson Member of the Jupiter Formation.

*Occurrence.* - Locality: A924-Dicoelosia Creek, 10 km from the tributary bridge on Dauphiné Creek Road. Richardson Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Genus PLATYTROCHALOS Jin, 1989  
PLATYTROCHALOS CRUDICOSTATUS Jin, 1989

*Discussion.* - This is the type species for this genus. The specific characteristics for this species are a small shell with a subcircular outline that is weakly to moderately convex. The hinge line is slightly curved, and the anterior commissure is strongly denticulate or wavy. The ventral umbo is very low with a small beak that is incurved. The delthyrium is open. The sulcus is anteriorly bordered by two coarse, high costae, with one costa at the bottom. The dorsal umbo is weakly convex and marked by a shallow median furrow that changes into a fold with two angular to subangular costae on the crest. Each shell flank is covered by three high, coarse, simple, and angular to subangular costae with increasing strength towards the anterior margin.

*Occurrence.* - Locality: A1277-1.1-1.2 km south of the Main Road, on Bell River Road. Lower 1-2 m of the Cybèle Member, Jupiter Formation, Telychian, Silurian; Anticosti Island, Quebec, Canada.

Superfamily CAMAROTOECHIOIDEA Schuchert, 1929(a)  
Family LEIORHYNCHIDAE Stainbrook, 1945  
Subfamily FENESTRIROSTRINAE Savage, 1996  
Genus FENESTRIROSTRA Cooper, 1955  
FENESTRIROSTRA GLACIALIS (Billings, 1862)

*Discussion.* - This is the type species for this genus. The specific characteristics for this species are a medium-sized shell that is nearly equibiconvex in adulthood. The shell measurements in millimeters are as follows:

	Average	Maximum	Minimum	N
Length	12.9	17.8	7.0	17
Width	15.9	22.1	7.2	17
Thickness	9.3	15.1	3.2	17

The hinge line is nearly straight or weakly curved, and the anterior commissure is weakly or moderately denticulate and uniplicate. The ventral umbo is low and rounded with a sharp median carination. The beak is strongly incurved and appressed onto the opposite umbo in relatively large specimens and erect to suberect in smaller forms. The delthyrium is open or has rudimentary deltidal plates. The umbonal median carination of the ventral valve changes into a sulcus commonly marked by three major costae increasing by intercalation to six to ten at the anterior margin. The dorsal umbo is strongly convex with the beak buried in the delthyrial cavity. The median groove of the dorsal umbo changes into a fold anterior of the hinge line. The fold is occupied by four major costae and increases to eight to ten near the anterior margin. The costae are high and angular in the posterior one-third of the shell and low and rounded toward the anterior end of the shell.

*Occurrence.* - Locality: A1492b-6.8 km east of Bell River Road on the Main Road; 28.9 km east of Bell River Road, on Main Road. Merrimack Formation, Rhuddanian, Silurian; East Point Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Order ATRYPIDA Rzhansnitskaia, 1960  
 Suborder ATRYPIDINA Moore, 1952  
 Superfamily ATRYPOIDEA Gill, 1871  
 Family ATRYPIDAE Gill, 1871  
 Subfamily ATRYPINAE Gill, 1871

Genus DIHELICTERA Copper, 1995  
DIHELICTERA ACROLOPHA Copper, 1995

*Discussion.* – The specific characteristics of this species are a small- to medium-sized shell that is weakly biconvex, with a relatively straight hinge line. There is a small protruding orthocline area featuring a proportionally prominent pedicle opening flanked by two deltidal plates. The pedicle valve is weakly carinate. The commissure is weakly sulcate to rectimarginate to weakly plicate. The ribs are long, straight, and tubular posteriorly but have weak concentric growth interruptions toward the commissure and are especially well-defined in the rib troughs. This species is found only in the East Point Member of the Jupiter Formation.

*Occurrence.* - Locality: A1275-1.9 km east of Bell Road on the Main Road. East Point Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Genus GOTATRYPA Struve, 1966  
GOTATRYPA sp. A

*Discussion.* – This species commonly occurs with *Dicoelosia* at this location. The specific characteristics of this genus include a small- to medium-sized shell, that is globose and ventribiconvex to biconvex to weakly dorsibiconvex in profile. The hinge line is relatively straight, and the foramen is transapical or obscured. The fine ribs are intersected by closely spaced, weak, wavelike growth lamellae that project less than two to three millimeters and are commonly pointed as spines and are longer in rib troughs. There is a weak to absent fold and sulcus. Shell measurements in millimeters are as follows:

	Average	Maximum	Minimum	N
Length	20.3	24.9	11.9	60
Width	21.1	28.1	12.2	60
Thickness	13.7	17.8	6.3	60

*Occurrence.* - Locality: A924-Dicoelosia Creek, 10 km from the tributary bridge on Dauphiné Creek Road. Richardson Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

#### GOTATRYPA sp. B

*Discussion.* - These specimens have the same general features as *Gotatrypa* sp. A. But are not well preserved, so it is hard to tell if they are the same species and have been designated as a different species because of this.

*Occurrence.* - Locality: A1412-Chicotte-Galiote Road, 4.2 km east of Rat River. Chicotte Formation, Telychian, Silurian; Anticosti Island, Quebec, Canada.

#### GOTATRYPA sp. C

*Discussion.* - These specimens have the same relative features as *Gotatrypa* sp. A, but they seem to have less or smaller growth lamellae. There were only five specimens collected, and they were not preserved well, so it is difficult to determine whether they are the same species as *Gotatrypa* sp. A. They are designated as a different species.

*Occurrence.* - Locality: 2 km east of the mouth of Martin River (formerly Iron River) on the coast. Middle Ferrum Member, Jupiter Formation, Telychian, Silurian; Anticosti Island, Quebec, Canada.

Genus JOVIATRYPA Copper, 1995  
JOVIATRYPA BRABYLA Copper, 1995

*Discussion.* – The specific characteristics for this species are a relatively large shell that is globose and strongly biconvex to dorsibiconvex in profile. The hinge line is short and the hinge corners are highly rounded. The anterior commissure is weakly plicate and almost rectimarginate. The hypercline area is obscured by a strongly incurved beak. The foramen is commonly enlarged into the umbo or covered by the beak incurvature, leaving a slit-like gape. There are relatively long, smooth, tubular ribs, and weak concentric growth interruptions with no frills. This species is only found in the lower Goéland Member of the Jupiter Formation. There were only seven specimens collected.

*Occurrence.* - Locality: A1264-300 m from tributary bridge on Dauphiné Creek Road. Goéland Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Suborder LISSATRYPIDINA Copper, 1996  
Superfamily LISSATRYPOIDEA Twenhofel, 1914  
Family SEPTATRYPIDAE Kozłowski, 1929  
Subfamily SEPTATRYPINAE Kozłowski, 1929  
Genus SEPTATRYPA Kozłowski, 1929  
Subgenus SEPTATRYPA (SEPTATRYPA) Kozłowski, 1929  
SEPTATRYPA (SEPTATRYPA) JULIA ?

*Discussion.* – The specific characteristics of this species are a medium-sized shell that is rounded to subtriangular or subquadrate, and dorsibiconvex in profile. The ventral valve is relatively flat to concave posteriorly in specimens with a high fold. The shell is smooth or corrugated. There is a pinched beak with a small anacline to hypercline area. There is a minute apical to transapical foramen obscuring the small deltidal plates. It has

a high strongly defined U-shaped commissure. There were six specimens collected. Most specimens are small (may be young), and the U-shaped commissure is not fully developed.

*Occurrence.* - Locality: A1275-1.9 km east of Bell Road on the Main Road. East Point Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

Order ATHYRIDIDA Boucot, Johnson, Stanton, 1964  
Suborder ATHYRIDINA Boucot, Johnson, Stanton, 1964  
Superfamily MERISTELLOIDEA Waagen, 1883  
Family MERISTELLIDAE Waagen, 1883  
Subfamily MERISTELLINAE Waagen, 1883  
Genus HINDELLA Davidson, 1882  
HINDELLA UMBONATA (Billings, 1857)

*Discussion.* - The specific characteristics for this species are a small- to medium-sized shell that is elongate to ovate in profile. The sides form a continuous gentle curve from the umbo of the ventral valve to the front margin. The front margin is either rounded or with a small portion in the middle straight. The ventral valve is strongly convex with a large, rounded, very prominent umbo. The beak is incurved down to the umbo of the dorsal valve. The dorsal valve is moderately convex with an obtusely rounded umbo and a concealed beak. The hinge line is curved but distinct. The surface is smooth, or it may have obscure accretion ridges. Only five specimens were collected.

*Occurrence.* - Locality: A84-coastal section south of Junction Cliff (Parastrophinella Bluff). Velleda Member, Ellis Bay Formation, Hirnantian, Ordovician; Anticosti Island, Quebec, Canada.

Superfamily ATHYRIDOIDEA Davidson, 1881  
Family HYATTIDINIDAE Sheehan, 1977  
Genus HYATTIDINA Schuchert, 1913(a)  
HYATTIDINA JUNEAE (Billings, 1857)

*Discussion.* – The specific characteristics for this species consist of a small to medium-sized shell that is biconvex with a pentagonal outline. It may be covered with numerous growth lines. There is also a ventral sulcus and corresponding dorsal fold that may be accentuated by bounding furrows. There were 112 specimens collected for this species.

*Occurrence.* - Locality: A1494-11.1 km east of Bell River Road on the Main Road; A1468-Main Road intersection with North Branch of Dauphiné Creek; A1264-300m from tributary bridge on Dauphiné Creek Road; A1455-Dauphiné Creek Road, 1.8km from Dauphiné Cabin Road. Goéland Member, Jupiter Formation, Aeronian, Silurian; Anticosti Island, Quebec, Canada.

#### ACKNOWLEDGMENTS

W. I. Ausich, The Ohio State University, allowed access to the specimens he collected over the summers of 1998, 2001, and 2002. He also lent valuable advice and references in the writing of this paper. He improved an earlier version of this manuscript.



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